

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

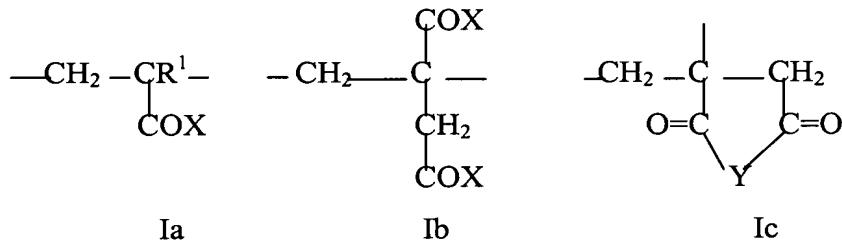
1. (Currently Amended) A fluidising admixture for use with sprayable cementitious compositions, the admixture consisting of:

(1) 2-phosphonobutane-1,2,4-tricarboxylic acid;

(2) optionally, citric acid; and

(3) at least one polymer derived from ethylenically-unsaturated mono-or dicarboxylic acids, and characterised in that the polymer consists of:

a) 51-95 mole % of moieties of formula 1a and/or 1b and/or 1c



wherein R^1 = hydrogen or a C₁₋₂₀ aliphatic hydrocarbon residue;

X = O_a M, -O-(C_mH_{2m}O)_n-R², -NH-(C_mH_{2m}O)_n-R²,

M = hydrogen, a mono-or divalent metal cation, an ammonium ion or an organic amine residue;

a=0.5 or 1;

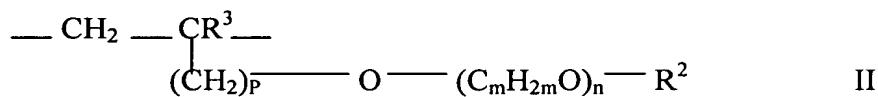
R² = hydrogen, C₁₋₂₀ aliphatic hydrocarbon, C₅₋₈ cycloaliphatic hydrocarbon or optionally substituted C₆₋₁₄ aryl residue;

Y= O, NR²;

m= 2-4; and

n= 0-200;

b) 1-48.9 mole% of moieties of the general formula II

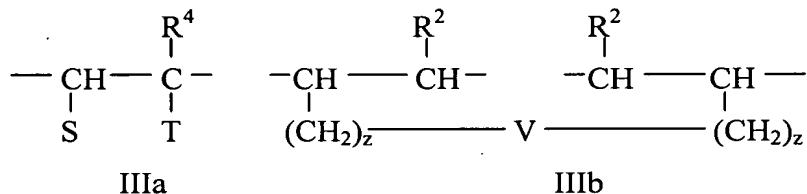


wherein R^3 = hydrogen or C₁₋₅ aliphatic hydrocarbon;

$p = 0\text{-}3$; and

R^2 has the meaning given previously;

c) 0.1-5 mole % of moieties of Formulae IIIa or IIIb



wherein $S = H, -COO_aM, -COOR^5$

$$T = U^1 - (CH_3 - CH_2 - O)_x - (CH_2 - CH_2 O)_y R^6$$

-W-R⁷

$$-\text{CO}-[\text{NH}-(\text{CH}_2)_3]_s-\text{W}-\text{R}^7$$

$$-\text{CO-O-(CH}_2\text{)}_z\text{-W-R}^7$$

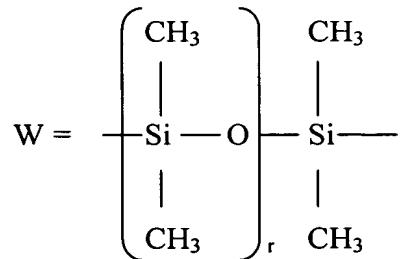
$$-(\text{CH}_2)_z-\text{V}-(\text{CH}_2)_z-\text{CH}=\text{CH}-\text{R}^2$$

= - COOR⁵ when S is - COOR⁵ or COO_a M

$U^1 = -CO-NH-, -O-, -CH_2O-$

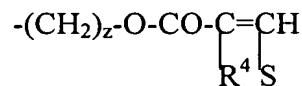
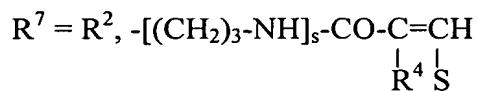
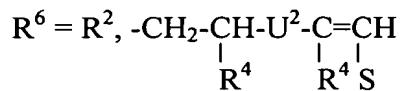
$U^2 = -\text{NH-CO-}, -\text{O-}, -\text{OCH}_2-$

V =-O-CO-C₆H₄-CO-O- or -W-



$R^4 = H, CH_3$

R^5 = a C₃₋₂₀ aliphatic hydrocarbon residue, a C_{5-C₈} cycloaliphatic hydrocarbon residue or a C₆₋₁₄ aryl residue;



wherein

$$r = 2-100$$

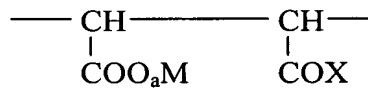
$$s = 1, 2$$

$$z = 0-4$$

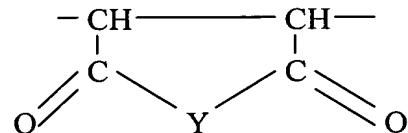
$$x = 1-150$$

$$y = 0-15; \text{ and}$$

d) 0-47.9 mole % of moieties of the general formula IVa and / or IV b:



IVa



IVb

wherein a, M, X and Y have the significances hereinabove defined meanings defined above.

2. (Currently Amended) A fluidising admixture according to claim 1, in which:

a) the moiety is according to formula Ia;

R^1, R^2 are independently H or CH₃;

X= O_a M, -O-(C_m H_{2m}O)_n-R²

M = H or a mono-or divalent metal cation;

a = 1;

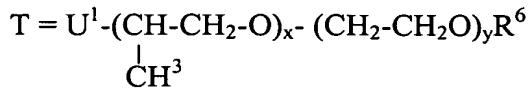
Y= O, NR²;

m= 2-3; and

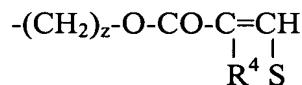
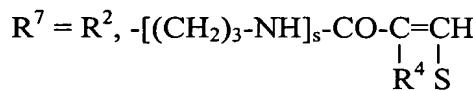
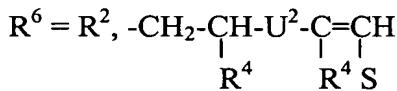
n= 20-150;

b) R², R³ are independently H or CH₃; and
 p = 0-1; and

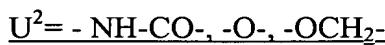
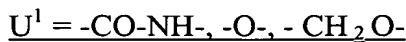
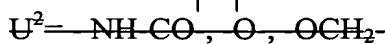
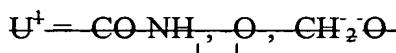
c) the moiety is according to formula IIIa;



R⁴, R⁵ are independently H, CH₃;



wherein



x = 20-50;

y = 1-10; and

z = 0-2.

3. (Currently Amended) A fluidising admixture according to claim 2, in which:

a) the moiety is according to formula Ia;

R¹ = H;

R² = CH₃;

X = O_a M;

M = a mono-or divalent metal cation;

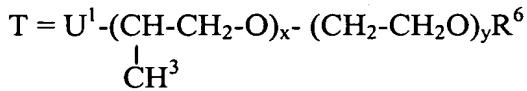
Y = O, NR²;

m = 2; and

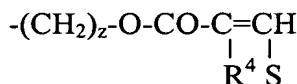
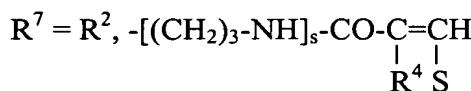
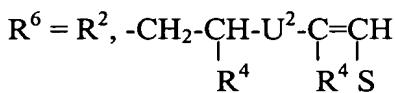
$n = 25-50;$
b) $R^2, R^3 = H$; and
 $p = 0$; and

c) the moiety is according to formula IIIa;

$S = H, -COO_aM;$



$R^4, R^5 = H$;



wherein

$U^1 = -CO - NH -$;

$U^2 = -NH - CO -$, $-O -$, $-OCH_2 -$

$x = 20-50$;

$y = 5-10$; and

$z = 1-2$.

4. (Currently Amended) A method of imparting flow to a cementitious composition, comprising the addition thereto of [[an]] the admixture according to any one of claims of claim 1[-3].

5. (Currently Amended) A method of spraying a cementitious composition comprising [[by]] preparing a cementitious mix and conveying the mix to a spray nozzle, there being added to the mix at preparation [[an]] the admixture according to of claim 1.

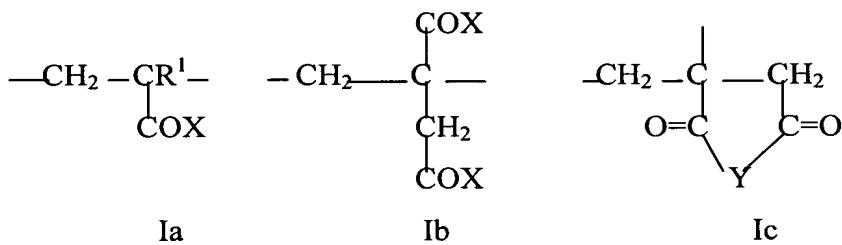
6. (New) The admixture of claim 1 wherein the polymer has a weight-average molecular weight of from about 5,000 to about 50,000.

7. (New) The admixture of claim 1 wherein the polymer has a weight-average molecular weight of from about 10,000 to about 40,000.

8. (New) The admixture of claim 1 wherein the proportions of the solids of the three components are:
 Component 1 - about 1% to about 40%;
 Component 2 - 0 to about 40%; and
 Component 3 - about 5% to about 60%.

9. (New) The method of claim 4 wherein the admixture is added at a rate of from about 0.2% to about 2% by weight solids of cement.

10. (New) A fluidising admixture for use with sprayable cementitious compositions, the admixture comprising:
 (1) 2-phosphonobutane-1,2,4-tricarboxylic acid;
 (2) optionally, citric acid monohydrate; and
 (3) at least one polymer derived from ethylenically-unsaturated mono-or dicarboxylic acids, and characterised in that the polymer comprises:
 a) 51-95 mole % of moieties of formula 1a and/or 1b and/or 1c



wherein R¹ = hydrogen or a C₁₋₂₀ aliphatic hydrocarbon residue;
 X = O_a M, -O-(C_mH_{2m}O)_n-R², -NH-(C_mH_{2m}O)_n-R²,
 M = hydrogen, a mono-or divalent metal cation, an ammonium ion or an organic amine residue;

a=0.5 or 1;

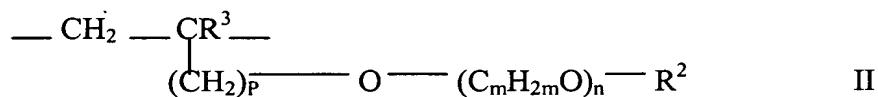
R² = hydrogen, C₁₋₂₀ aliphatic hydrocarbon, C₅₋₈ cycloaliphatic hydrocarbon or optionally substituted C₆₋₁₄ aryl residue;

Y= O, NR²;

m= 2-4; and

n= 0-200;

b) 1-48.9 mole% of moieties of the general formula II

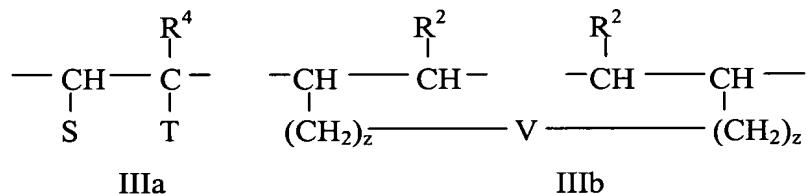


wherein R³ = hydrogen or C₁₋₅ aliphatic hydrocarbon;

p = 0-3; and

R² has the meaning given previously;

c) 0.1-5 mole % of moieties of Formulae IIIa or IIIb



wherein S = H, -COO_aM, - COOR⁵

T = U¹- $\left(\text{CH}-\text{CH}_2-\text{O}\right)_x-$ $\left(\text{CH}_2-\text{CH}_2\text{O}\right)_y\text{R}^6$
 |
 CH³

-W-R⁷

-CO-[NH-(CH₂)₃]_s-W-R⁷

-CO-O-(CH₂)_z-W-R⁷

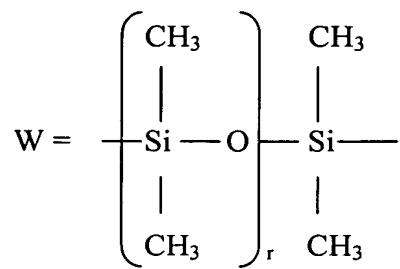
-(CH₂)_z-V-(CH₂)_z-CH=CH-R²

= - COOR⁵ when S is - COOR⁵ or COO_aM

U¹ = -CO-NH-, -O-, -CH₂O-

U² = - NH-CO-, -O-, -OCH₂-

V = -O-CO-C₆H₄-CO-O- or -W-



R⁴ = H, CH₃

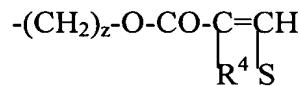
R⁵ = a C₃₋₂₀ aliphatic hydrocarbon residue, a C_{5-C₈} cycloaliphatic hydrocarbon residue or a C₆₋₁₄ aryl residue;

R⁶ = R², -CH₂-CH-U²-C=CH

$$\begin{array}{c} | \\ \text{R}^4 \\ | \\ \text{R}^4 \text{S} \end{array}$$

R⁷ = R², -[(CH₂)₃-NH]_s-CO-C=CH

$$\begin{array}{c} | \\ \text{R}^4 \text{S} \end{array}$$



wherein

r = 2-100

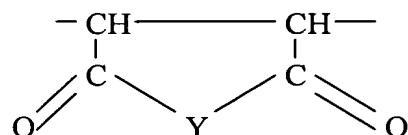
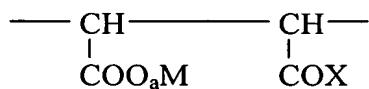
s = 1, 2

z = 0-4

x = 1-150

y = 0-15; and

d) 0-47.9 mole % of moieties of the general formula IVa and / or IV b:



IVa

IVb

wherein a, M, X and Y have the meanings defined above.

11. (New) A fluidising admixture according to claim 10, in which:

a) the moiety is according to formula Ia;

R^1, R^2 are independently H or CH_3 ;

$X = O_a M, -O-(C_m H_{2m}O)_n-R^2$

$M = H$ or a mono-or divalent metal cation;

$a = 1$;

$Y = O, NR^2$;

$m = 2-3$; and

$n = 20-150$;

b) R^2, R^3 are independently H or CH_3 ; and

$p = 0-1$; and

c) the moiety is according to formula IIIa;

$S = H, -COO_aM, -COOR^5$

$T = U^1-(CH-CH_2-O)_x-(CH_2-CH_2O)_yR^6$
 $\quad \quad \quad |$
 $\quad \quad \quad CH^3$

$-CO-[NH-(CH_2)_3]_s-W-R^7$

$-CO-O-(CH_2)_z-W-R^7$

R^4, R^5 are independently H, CH_3 ;

$R^6 = R^2, -CH_2-CH-U^2-C=CH$
 $\quad \quad \quad | \quad |$
 $\quad \quad \quad R^4 \quad R^4 S$

$R^7 = R^2, -[(CH_2)_3-NH]_s-CO-C=CH$
 $\quad \quad \quad | \quad |$
 $\quad \quad \quad R^4 \quad S$

wherein

$U^1 = -CO-NH-, -O-, -CH_2O-$

$U^2 = -NH-CO-, -O-, -OCH_2-$

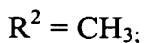
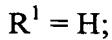
$x = 20-50$;

$y = 1-10$; and

$z = 0-2$.

12. (New) A fluidising admixture according to claim 11, in which:

a) the moiety is according to formula Ia;



M = a mono-or divalent metal cation;



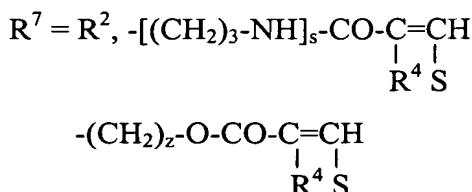
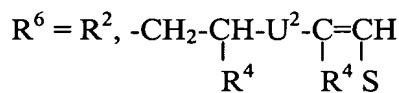
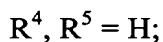
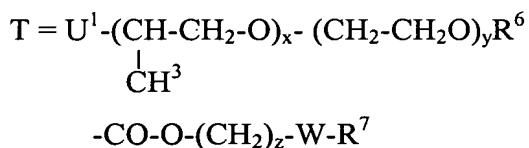
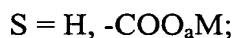
m = 2; and

n = 25-50;

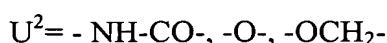
b) $R^2, R^3 = H$; and

p = 0; and

c) the moiety is according to formula IIIa;



wherein



x = 20-50;

y = 5-10; and

z = 1-2.

13. (New) A method of imparting flow to a cementitious composition, comprising the addition thereto of the admixture of claim 10.

14. (New) A method of spraying a cementitious composition comprising preparing a cementitious mix and conveying the mix to a spray nozzle, there being added to the mix at preparation the admixture of claim 10.
15. (New) The admixture of claim 10 wherein the polymer has a weight-average molecular weight of from about 5,000 to about 50,000.
16. (New) The admixture of claim 10 wherein the polymer has a weight-average molecular weight of from about 10,000 to about 40,000.
17. (New) The admixture of claim 10 wherein the proportions of the solids of the three components are:
Component 1 - about 1% to about 40%;
Component 2 – 0 to about 40%; and
Component 3 – about 5% to about 60%.
18. (New) The method of claim 13 wherein the admixture is added at a rate of from about 0.2% to about 2% by weight solids of cement.